



THE NASA COMMERCIAL CREW PROGRAM (CCP) SHARED ASSURANCE MODEL FOR SAFETY



CQDSI 201
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Greetings



❖ Mr. Terry Wilcutt

- Chief, Office of Safety and Mission Assurance, NASA Headquarters

❖ Mr. Nathan Vassberg

- Chief S&MA Officer, Commercial Crew Program, Johnson Space Center

❖ Ms. Kathy Leuders

- Program Manager, Commercial Crew Program, Kennedy Space Center

- ❖ NASA established the Commercial Crew Program in order to provide human access to the International Space Station and low earth orbit via the commercial (non-governmental) sector.
- ❖ A particular challenge to NASA is how to determine the commercial provider's transportation system complies with Programmatic safety requirements while at the same time allowing the provider the flexibility to demonstrate compliance.
- ❖ This will be accomplished through the use of Risk Based Assessment (RBA) and Shared Assurance by NASA thus shifting more responsibility to the Provider. This model will be the focus of this presentation.

History/Current Status of CCP



❖ History

- The CCP started in 2010
- Funding was initially through research grant-like Space Act Agreements
- Also one contract to develop certification products

❖ Commercial Crew transportation CAPabilities (CCtCAP) Contract Selection

- Selection announced in September
 - Two selectees:
 - Boeing
 - SpaceX
- What it funds
 - Two test flights and two to six missions per selectee
- Providers vs Partners
 - Program still determining which term to use
- Public-Private Partnership
 - NASA to be prime customer
 - Provider may use vehicle for other purposes

❖ Alternate Standards

- Provider must comply with Programmatic standards but may propose alternate standards
 - Type I – Full compliance or requires variance
 - Type II – May propose Alternate Standard or demonstrate compliance
 - Type III – Reference Only; may use own standards without NASA approval

Safety Requirements



- ❖ S&MA Agency requirements owned by the Technical Authority
 - Flow-down and implementation owned by CCP
 - Management of risks
 - Primary S&MA document is NPR 8705.2, “Human-Rating Requirements for Space Systems”
 - S&MA is a stakeholder not owner
 - 78 of approximately 300
 - CCP determines compliance with advice of S&MA
 - Disagreements
- ❖ Loss of Crew/Loss of Mission (LOC/LOM)
 - Consistent with NASA’s goals and thresholds
 - Part of overall certification process
 - Values represent effort to increase safety of the system relative to Space Shuttle
- ❖ Compliance with ISS requirements

Hazard Report Review Process



- ❖ Safety Technical Review Board (STRB)
 - Program's designated Board to review Hazard Reports
 - S&MA is a member, not owner, of the process
- ❖ Provides 45 day review process
 - Pre-defined review team to determine acceptability
 - Multi-discipline Core Review Team
 - Core Team comments consolidated, reviewed and coordinated with the ISS Safety Review Panel (SRP)
 - Results sent to Provider for updating of material prior to Review
 - Provider presents to STRB/ISS SRP
- ❖ Delegated authority from Program Control Board (PCB) to approve Hazard Reports
 - Demonstrate compliance
 - No increase in Program risk
- ❖ Initial review of safety variances
 - Recommendation to PCB

- ❖ How does NASA intend on performing its assurance function?
- ❖ Through:
 - Risk Based Assessments (RBA)
 - A method to assess the risk associated with each Hazard Report verification
 - Shared Assurance
 - A process by which another assurance function (programmatic, engineering, etc.) is accepted by S&MA to complete its function

Risk Based Assessments



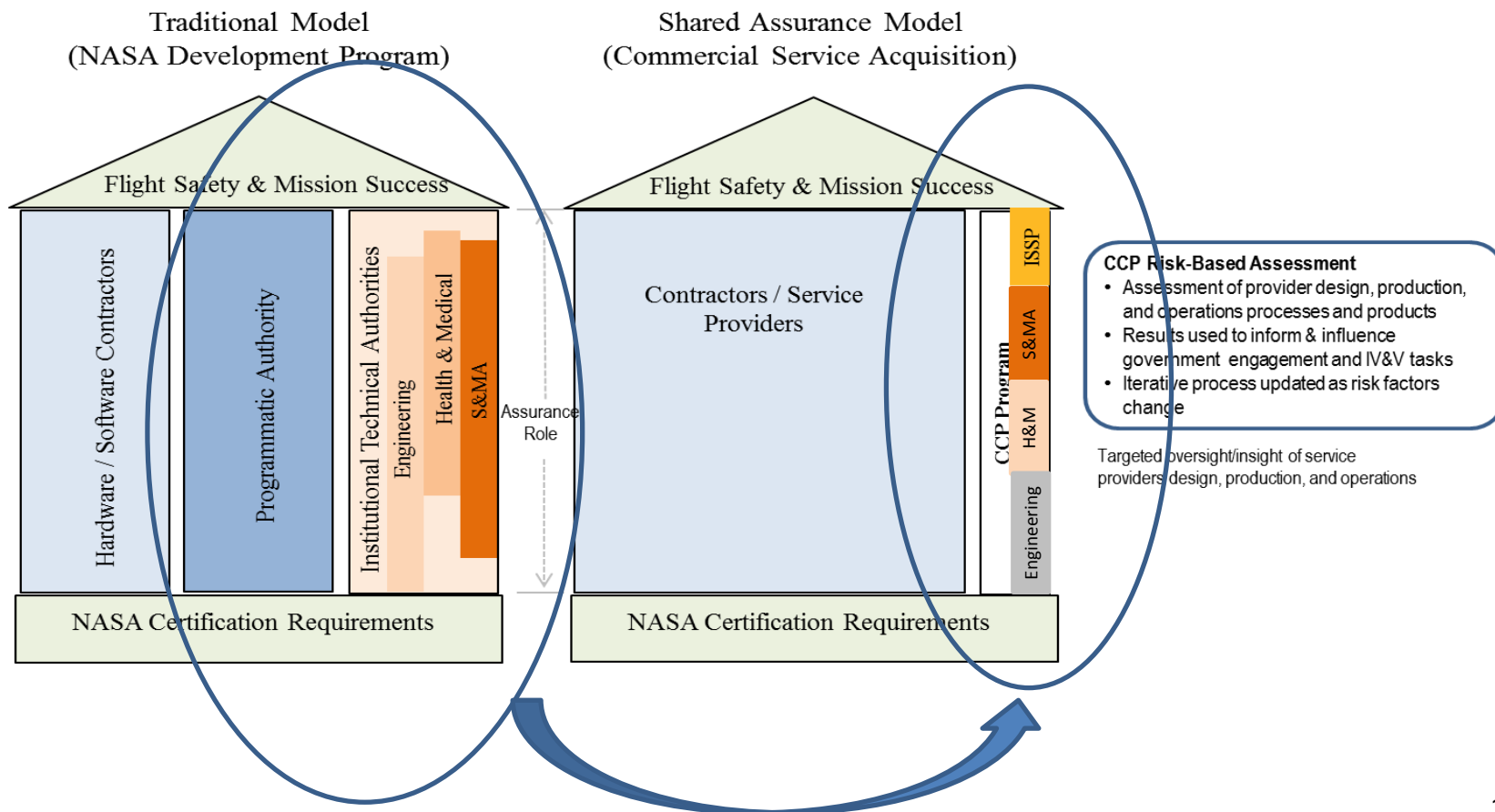
- ❖ Uses a “scoring sheet” to assess the risk related to each hazard report verification statement
- ❖ The scoring considers many aspects of risk:
 - Likelihood of Failure
 - Design Complexity
 - Design Maturity
 - Past Performance
- ❖ Once the risk assessment is done as part of the HR review, the output is a Risk Ranked Verification List
- ❖ The Surveillance activity will then be grouped
 - Witness Process (GMIP)
 - Examine Product
 - Audit
 - Record Review
- ❖ RBAs will be implemented by Shared Assurance

Shared Assurance



- ❖ Once the RBA is completed on Provider's Hazard Reports, CCP S&MA will implement a Shared Assurance model
- ❖ Shared Assurance
 - Uses other organizations for assurance
 - Eliminates duplication of effort
 - Confidence in other organization's personnel
 - Does not create new work for the other organizations
 - Does not replace S&MA
 - Allows S&MA to focus limited resources in higher risk areas
- ❖ Shifts role of certification more to Provider
 - Away from traditional NASA "approval"
 - Service not hardware

Traditional Assurance vs. Shared Assurance



Where Are We Now?



❖ RBA status

- Initial trial runs being conducted using Phase II safety data
- Team converging on a methodology
 - No Plan Survives First Contact

❖ Audit/Surveillance activity from the last several months

- Planning
- Ride-a-long
- Audits conducted by others – future credit

❖ Audit plan forward for the next 6 months.

- Systems Safety
- Execution Plan due end of February

❖ Certificate of Flight Readiness (CoFR)

- A notional CoFR Plan is in work
- Describes what was completed
- Describes what was not covered

Summary



We feel that with the processes here, the Commercial Crew Program and the Safety & Mission Assurance Technical Authority will be well positioned to assure that the Commercial Providers are complying with the applicable safety requirements including LOC/LOM.

Q U E S T I O N S ?